

Airborne Isotopic Hydrocarbon Analyzer for Titan, Phase II

Completed Technology Project (2009 - 2012)



Project Introduction

Trace species measurement on unmanned atmospheric research craft suitable for interplanetary travel is a demanding application for optical sensing techniques. Yet optical techniques offer many advantages including high-precision, fast response, and strong species selectivity. Balloonsonde, kite, unmanned aerial vehicle (UAV), or glider deployment demands that optical sensors meet stringent size, weight and power requirements. Vista Photonics proposes to construct rugged, compact, low-power optical sensor prototypes capable of selectively determining isotopic-resolved hydrocarbons at Titan-relevant concentrations. The sensor will be demonstrated in Phase II by airborne measurement of CO₂ and water vapor on Earth. The enabling technology for meeting stringent NASA mission requirements is a new rugged, compact, and lightweight optical path length enhancement cell that recovers the established sensitivity of high-performance optical absorption detection techniques on a platform with no moving parts. The proposed spectrometer will be capable of detecting multiple species with little additional weight or power penalties.

Anticipated Benefits

Potential NASA Commercial Applications: Phase III commercial applications abound for sensors whose performance and physical characteristics are suitable for spaceflight. Two specifically targeted applications are high-performance unmanned airborne detection of carbon dioxide/water vapor and carbon dioxide leak detection at power plant carbon capture & sequestration sites. Other examples include contaminant monitoring in process gas streams in the chemical and microelectronics industries, medical diagnosis through detection of biogenic gases in human breath that correlate to specific pathologies, and environmental monitoring and regulatory compliance in agriculture, power production, and occupational safety. The fully-developed Phase II instruments shall offer a compelling and desirable blend of performance, affordability, compactness, simplicity and ease-of-use relative to present commercial product offerings in these applications.



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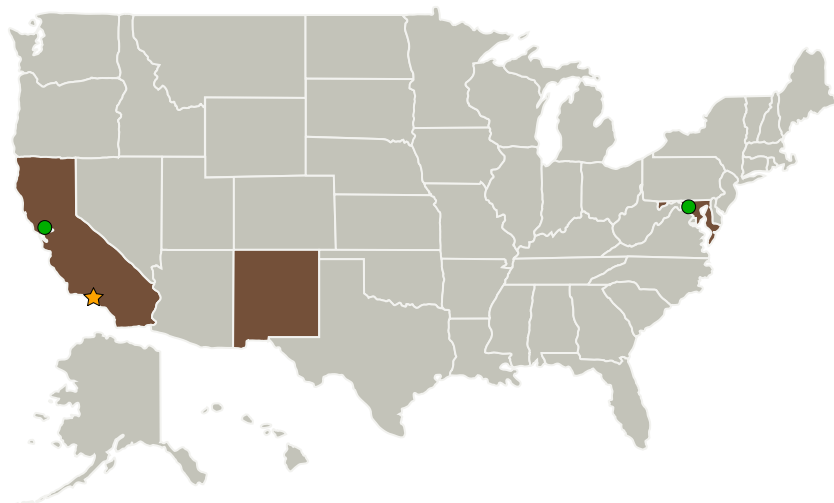
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland
Vista Photonics, Inc.	Supporting Organization	Industry	Santa Fe, New Mexico

Primary U.S. Work Locations

California	Maryland
New Mexico	

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Gary C Jahns

Principal Investigator:

Jeffrey Pilgrim

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Project Transitions

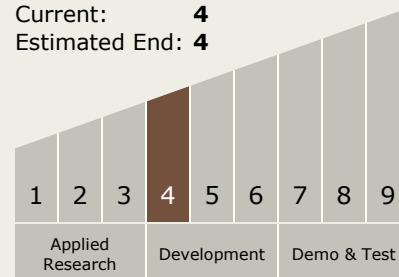
 **February 2009:** Project Start

 **September 2012:** Closed out

Closeout Summary: Airborne Isotopic Hydrocarbon Analyzer for Titan, Phase II
Project Image

Technology Maturity (TRL)

Start: **4**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.4 Environmental Monitoring, Safety, and Emergency Response
 - └ TX06.4.2 Fire: Detection, Suppression, and Recovery